Observations during GRIP from HIRAD: Images of C-band brightness temperatures and ocean surface wind speed and rain rate

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HIRAD (Hurricane Imaging Radiometer) flew on the WB-57 during NASA's GRIP (Genesis and Rapid Intensification Processes) campaign in August – September of 2010. HIRAD is a new C-band radiometer using a synthetic thinned array radiometer (STAR) technology to obtain cross-track resolution of approximately 3 degrees, out to approximately 60 degrees to each side of nadir. By obtaining measurements of emissions at 4, 5, 6, and 6.6 GHz, observations of ocean surface wind speed and rain rate can be inferred. This technique has been used for many years by precursor instruments, including the Stepped Frequency Microwave Radiometer (SFMR), which has been flying on the NOAA and USAF hurricane reconnaissance aircraft for several years. The advantage of HIRAD over SFMR is that HIRAD can observe a +/- 60-degree swath, rather than a single footprint at nadir angle.

Results from the flights during the GRIP campaign will be shown, including images of brightness temperatures, wind speed, and rain rate. To the extent possible, comparisons will be made with observations from other instruments on the GRIP campaign, for which HIRAD observations are either directly comparable or are complementary. Features such as storm eye and eyewall, location of vortex wind and rain maxima, and indications of dynamical features such as the merging of a weaker outer wind/rain maximum with the main vortex may be seen in the data. Potential impacts on operational ocean surface wind analyses and on numerical weather forecasts will also be discussed.